



University of Baghdad
Al-Khwarizmi College of
Engineering Automated
Manufacturing Engineering
Department

Engineering statistics

Lecture1

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Outline

- Descriptive and Inferential Statistics
- Variables and Types of Data
- Data Collection and Sampling techniques

Statistics

It is the science of conducting studies to collect, organize, summarize, analyze, and draw conclusions from data

Descriptive and Inferential

- **Variable** – a characteristic or attribute that can assume different value.
- **Data** – are values that the variables can assume.
- **Random Variables** – variables whose values are determined by chance.
- **Data set** – a collection of data values.
- **Data value** – Each value in the data set.

:Examples

- *Variables: a characteristic or attribute that can assume different value.*

–Grades, gender, height...‘

- *Data: are values that the variables can assume.*

} ,{89,98,99,100} –male, female}, {50cm, 100cm, 89cm,
{...

:Examples

- Random Variables: *variables whose values are determined by chance.*

–Number of heads or tails in tossing a coin, results in tossing a die/s...

- Data set: *a collection of data values.*

} , {89,98,99,100} –male, female}, {50cm, 100cm, 89cm,
. {...

Descriptive and Inferential

Data can be used in different ways. The body of knowledge called statistics is divided into two main areas, depending on how data are used. The two areas are:

- Descriptive statistics
- Inferential statistics

Descriptive and Inferential

- **Descriptive Statistics** – consists of the collection, organization, summarization and presentation of data.

Examples:

- ✓ Nine out of ten on-the-job fatalities are men.
- ✓ Expenditures for the cable industry were \$5.66 billion in 1996
- ✓ The national average annual medicine expenditure per person is \$.1052

Descriptive and Inferential

- **Inferential Statistics** – it consist of generalizing from samples to populations, performing estimations and hypothesis tests, determining relationships among variables, and making predictions.
 - Example:
 - The chances of winning the California Lottery are one chance in twenty-two million.
 - There is a relationship between smoking cigarettes and getting emphysema.

:Exercise

1. Financial analysts say that mortgage may soon hit bottom.
2. The monthly average expenditures of per household is P.10,000
3. The guard in the SM Megamall records the number of shoppers for the past 15 days.
4. The Philippine Regulation Commission (PRC) ranks the result of the Certified Public Accountants professional examination in .2010

Population

It consists of all subjects (human or otherwise) that are being studied

Example:

BISU Students

Filipino

Tourists

Boholana

...

Sample

Population	Sample

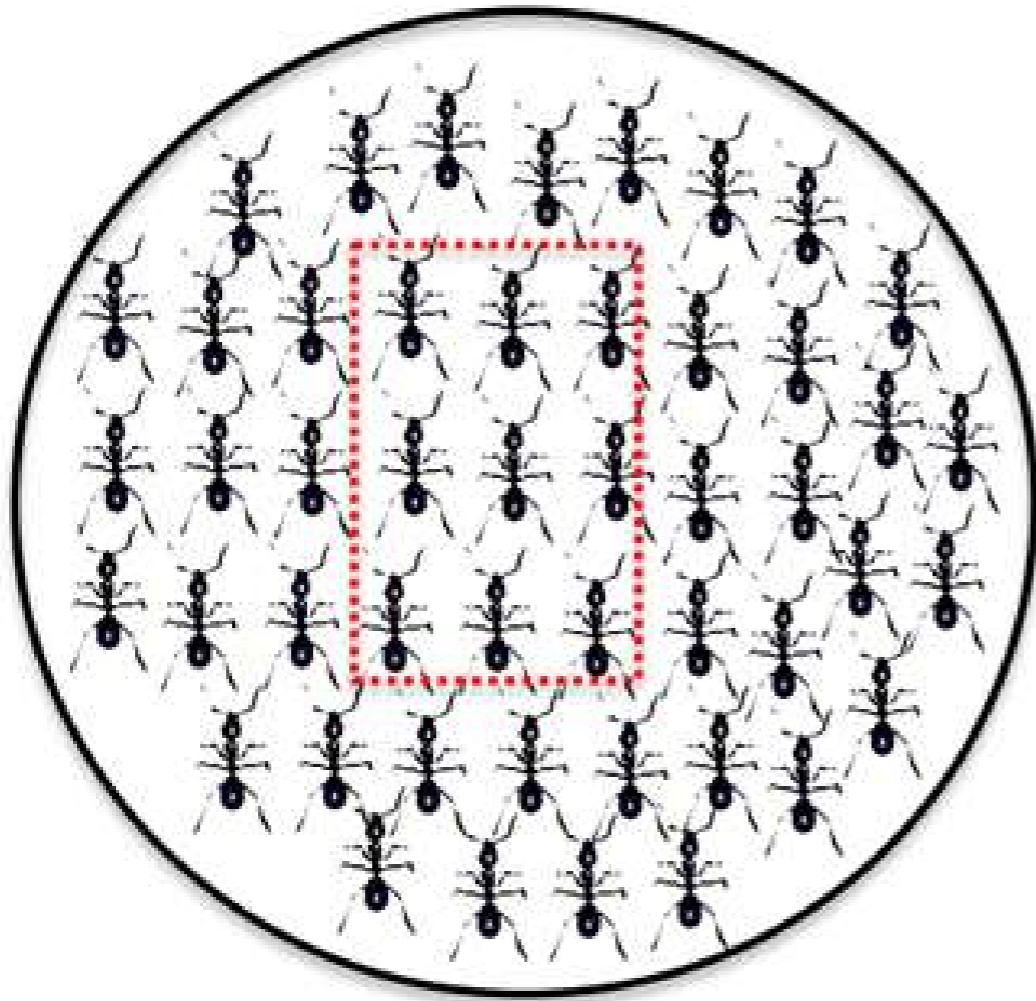
Sample

Population	Sample
BISU students	
Filipino	
Tourists	
Boholana	

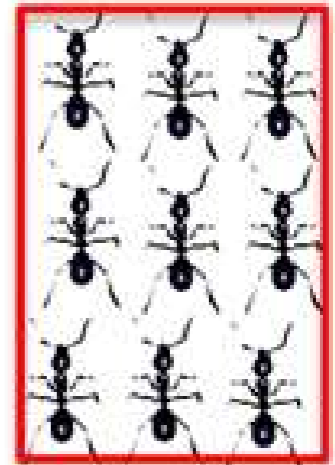
Sample

Population	Sample
BISU students	Tourism students
Filipino	Igorots
Tourists	2018Korean who visits in
Boholana	Female Tagbilaranon

Population (N)



Sample (n)



Variables and Types of Data

As stated in the first section, statisticians gain information about a particular situation by .collecting data for random variables

This section will explore greater detail the nature of variables and types of data

Variables and Types of Data

Variables can be classified

as

.Quantitative or Qualitative

Qualitative Data

These are variables that can be placed into distinct categories, according to some characteristic or attributes

Example

(Gender (feminine, masculine, bisexual

(Sex(male, female

...

Quantitative Data

These are variables are numerical and can be
. ordered or ranked

Example

Age, heights, weights, body temperatures

...

:Exercise

:Classify the variables as qualitative or quantitative

1. Automobile ownership of students.
2. Net weight (in grams) of package cereal.
3. Political party affiliation of civil service workers.
4. Number of bankrupt corporations per month in the Philippines.

Quantitative Data

Quantitative variables can be further classified
: into two groups

.Discrete and Continuous variables

Discrete variables

These variables can be assigned values such as 3, 2, 1, 0 and are said to be countable.

Examples of discrete variables are the **number of children in a family**, the number of student in a classroom, **the number of calls received by a switchboard operator each day for a month**.

Discrete variables

Assume values that can be
. counted

Continuous variables

These variables can assume an infinite number of values between any two .specific values

.They are obtained by measuring

They often include fractions and . decimals

:Exercise

:Identify each item as discrete or continuous •

1. Outcomes in rolling a pair of dice.

2. Square root of two.

3. $f(x)=x+3$

.4 Number of online purchases made in a week.

Variables

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graph TD; Variables[Variables] --> Qualitative[Qualitative]; Variables --> Quantitative[Quantitative]; Quantitative --> Discrete[Discrete]; Quantitative --> Continuous[Continuous];
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Qualitative

Quantitative

Discrete

Continuous